

CHAPTER 9

SPECIALTY STRUCTURES

9-1. General

This chapter deals primarily with those types of specialty structures which have potential application in military construction. Basic guidance regarding design of other types of specialty structures which may have only limited applicability to military projects is also provided.

9-2. Blast-resistant construction

Design of structures to resist the effects of accidental explosions will be in accordance with TM 5-1300/NAVFAC P-397/AFM 88-22. The reference is mandatory for explosive safety design. Design of structures to resist the effects of conventional weapons will be in accordance with TM 5-855-1, and design of facilities to resist the effects of nuclear weapons will be in accordance with TM 5-858-1, TM 5-858-2, TM 5-858-3, TM 5-858-4, TM 5-858-5 and TM 5-858-8. The design of blast-resistant structures must consider the transient loadings and dynamic response of the structure that results from the specified design event. Blast-resistant design is often required in conjunction with the construction of weapons system facilities, both developmental and operational, as well as for structures designed to resist the effects of intentional attack.

9-3. Corrosion-resistant structures

Specialty structures are often required for use in extremely corrosive areas such as in chemical processing plants, plating rooms, demineralizing and water polishing areas, and severe salt water environments. To attain the necessary corrosion resistance, structures in such areas are frequently fabricated from nonmetallic materials including fiberglass reinforced plastic, etc. When used, manufacturer's literature regarding the selected nonmetallic material will be carefully reviewed and closely followed during design of the structure. For additional discussions regarding corrosion-resistant

structures and construction refer to TM 5-809-2/AFM 88-3, Chapter 2; MIL-HDBK-1025/6; and NAVFAC DM-11.1.

9-4. Other structures

Other types of specialty structures include plate and shell structures, major arenas and stadiums, orbital space structures, test stands, launch structures, carbon fiber composite structures, etc. Design of structures of these types is highly specialized and is beyond the scope of this manual. If confronted with the need for structures such as these, the agency providing the design will obtain relevant references and identify the appropriate specialty consultants to assist in the design.

9-5. Load-tested designs

In lieu of the design approach discussed above and when consistent with budget and schedule, load-tested designs may be considered. This approach can be applicable to certain composite type structures or components such as those involving adhesive bonded elements, cellular foam, and newly developed materials. Toward that end, approved research laboratories will perform load tests and submit a full report including all test data for review. Minimum safety factors will be 2.5 with respect to ultimate strength or 1.65 with respect to yield strength of the material or system. Information describing any new load-tested materials or systems determined necessary, advantageous, and economical will be submitted for approval to appropriate headquarters.

9-6. Miscellaneous structures

Miscellaneous structures are those not listed elsewhere in this manual or not covered by a specific code or specification. Designs for these structures will be in accordance with related design codes, sound engineering practice and judgement, and relevant criteria based on the materials involved and the predicted loading.